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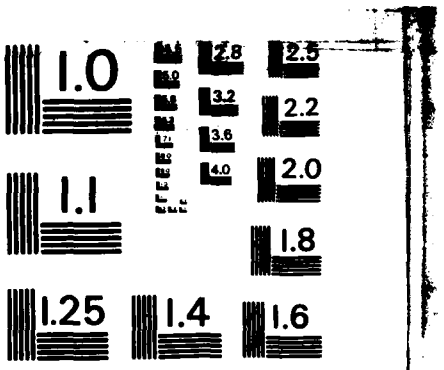

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Results of Demonstration
Of
JRIM Prototype Data Base

Technical Report

24 February 1984
Prepared Under Contract Number
DCA 100-83-C-0049

FOR
Defense Communications Agency
Command and Control Technical Center (C350)
The Pentagon

Submitted By:
CACI, INC.-FEDERAL
Systems Requirements and Development Department
1815 North Fort Myer Drive
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides an overview of the procedures employed in developing the Joint Requirements Integration Management (JRIM) Office prototype data base to support the integration of Resource Unit Monitoring (RUM) and Conventional Planning and Execution (CPE) functional requirements and the relating of those requirements to existing automated information processing systems. The prototype data base was developed using Problem Statement Language/Problem Statement Analyzer (PSL/PSA). This report reviews the

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development of the real-world and PSL/PSA models that depict the data base relationships, and references earlier technical reports that discuss in detail the derivation of the RUM and CPE functions (and subfunction) and associated data classes that are the primary media for manipulating the data base. Earlier technical reports also furnished the JRIMO staff with a Standards and Conventions Manual (techniques and procedures) for maintaining the data base as well as a simplified Users Manual and Help Guides that further assist users in acquiring a familiarity with the prototype data base. In conjunction with this effort, a formal users course and a formal technical (maintenance/operation of prototype) course, each of one week duration, were provided. Course attendees received appropriately detailed training material.

C.A.C.I.

WASHINGTON, D.C. OFFICES

24 February 1984

Command and Control Technical Center
The Pentagon
Attn: Lt. Col. Ennett (C350)
Washington, D.C. 20301

Reference: Contract DCA 100-83-C-0049 (CDRL Item 019)

Dear Lieutenant Colonel Ennett:

Attached are ten copies of the report on the results of the demonstration of the JRIM prototype data base. This report provides an overview of the procedures employed in developing the prototype data base and in demonstrating the capability to retrieve, manipulate and trace required data. This report constitutes CDRL Item 019.

Yours truly,

John C. Short

John C. Short
CACI Project Manager

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JRIM Prototype Data Base

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Systems Requirements and Development Department
1815 North Fort Myer Drive
Arlington, Virginia 22209

ABSTRACT

This report provides an overview of the procedures employed in developing the JRIM prototype data base and discusses the demonstration of the prototype.

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Results of Prototype Demonstration

1. Introduction

This report provides an overview of the results of the demonstration of the prototype data base developed for the JRIM to support the integration of RUM and CPE requirements and the relating of those requirements to existing automated information processing systems. The purpose of the demonstration was to show the capability to retrieve and trace information concerning systems, RUM and CPE functions and subfunctions, data classes, organizations, and other data needed to support RUM and CPE requirements integration. The demonstration was conducted in two phases. Phase I of the demonstration was presented in conjunction with the JRIM Prototype Data Base Users Training Course held during the week of 9 January 1984 and was executed on contractor computer resources. Phase II was presented during the week of 23 January 1984 and was executed on government computer resources. The purpose of the Phase II demonstration was to verify that the same functionality that was identified in the Phase I demonstration also existed on the government system. This report of the results of the demonstration is specified in the Contract Data Requirements List (CDRL) as Item 019 which is scheduled for delivery 300 days after the date of the contract award.

2. Discussion

The JRIMO staff is responsible for promoting centralized management of C^3 information and data processing systems in the RUM and CPE functional areas through the collection and integration of RUM and CPE functional requirements identified by various users. This responsibility points to the development of a data base to support an automated system that can relate requirements to existing systems. A prototype for such a data base has been constructed using Problem Statement Language/Problem Statement Analyzer (PSL/PSA), a computer-aided analysis technique developed at the University of Michigan. PSL is a computer processable language convention that describes systems in unambigious terms through a combination of formal statements and supplementary plain language text. PSA is a software package that processes the PSL statements and provides

the means to document and analyze these statements. Essentially, PSL/PSA can define and describe information in a data base, and provide analysis and reports of the stored information on request. It has the capability to check for data accuracy, completeness and consistency.

3. Procedures

Development of the data base was initiated by construction of a real-world model (Figure 1) that depicted the relationships between users, systems, and requirements in the joint community. The media for establishing these relationships were the RUM and CPE functions (and subfunctions) and the data classes associated with these functions. The RUM and CPE functions and subfunctions were derived from JCS Pub 19, Volume II, Annex B and other source requirement documents using a structured analysis methodology. Data classes were derived through a combination of structured analysis and the application of individual WWMCCS site information requirements for RUM and CPE functions as detailed in the WIS Operational and Information Requirements Surveys. RUM and CPE functions and subfunctions as well as associated data classes were initially defined in the Interim Technical Report of 29 July 1983. The real-world model was then translated into a PSL Model (Figure 2). In this translation, the objective is to map, with as many relationships as possible, each real-world object type (box) to one, and only one, PSL object type that symbolizes the purpose of the real-world object type. This translation is explained further in the Users Manual for the JRIM Data Model which was delivered as CDRL Item 022 on 12 January 1984.

A baseline that described approximately 400 existing joint community data processing systems was then developed and entered into a prototype data base. Each system was described in terms of the RUM and CPE functions/subfunction it was judged to support, the data classes it used or created, the type of system it was (Joint, Service Unique, Command/Site Unique), the source of the information concerning the system, and other relevant descriptive facts about the system that could be gleaned from available documentation. Likewise, representative requirements submitted by users through Required Operational Capability (ROC) statements or other means were also classified according to associated RUM and CPE

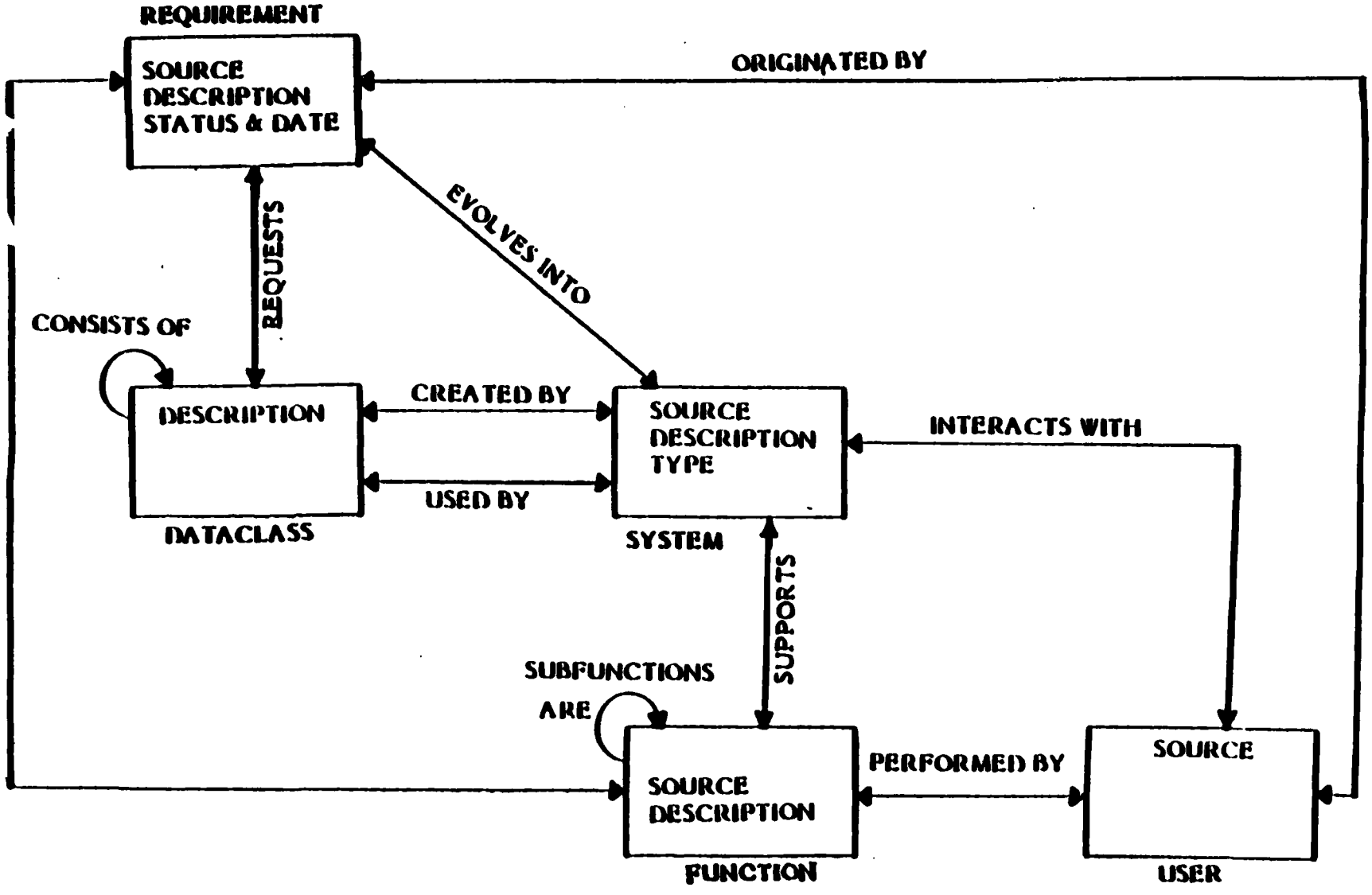

Figure 1

JRIM REAL WORLD MODEL

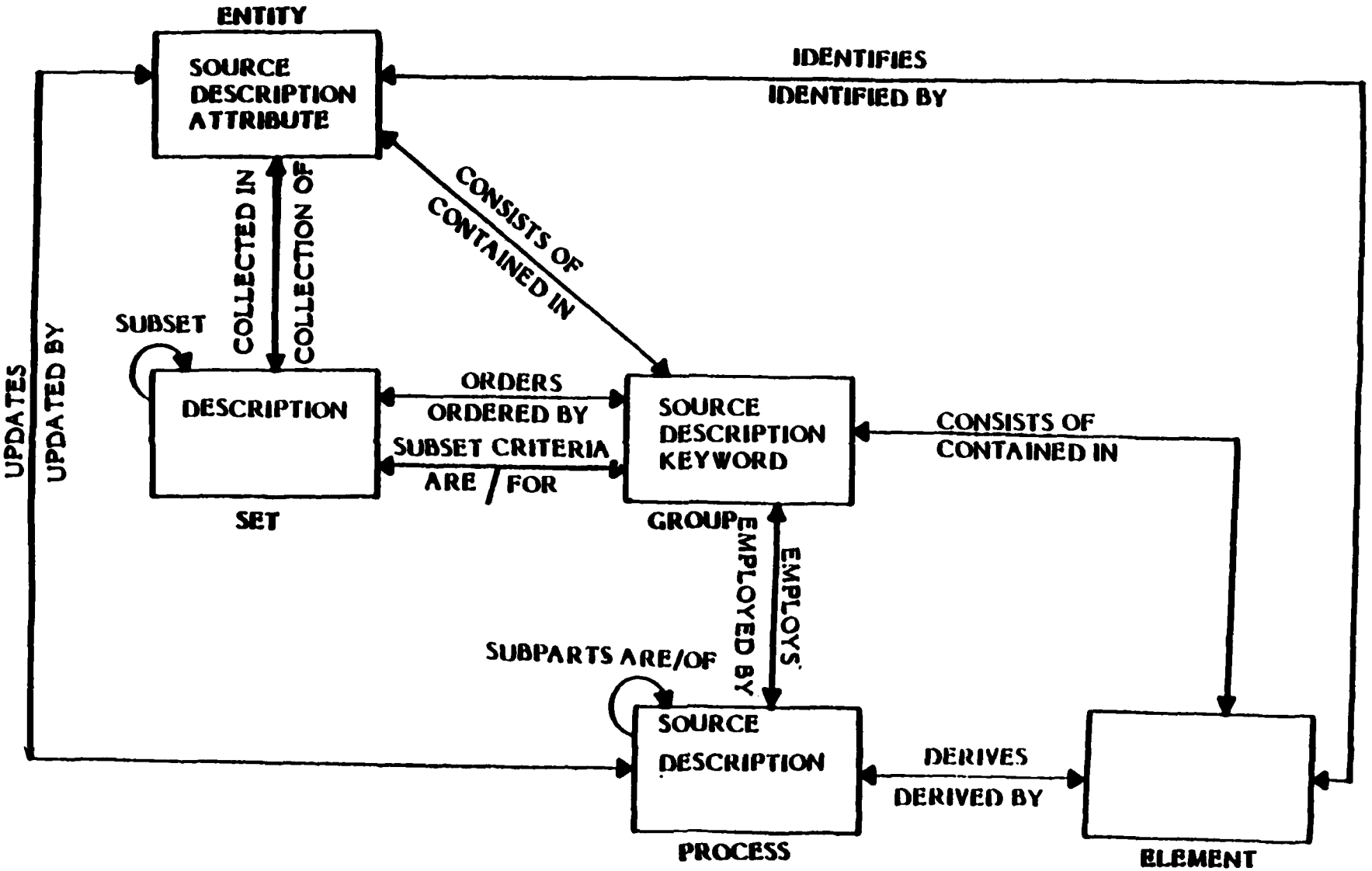

Figure 2
4

PSL DATA MODEL

functions/subfunctions and data classes and entered into the prototype data base. PSL/PSA was then employed in accordance with specifically tailored standards and conventions to establish the relationships indicated in Figure 2 and to manipulate the data base to respond to queries and to produce desired reports.

Standards and conventions for maintaining the JRIM prototype data base and a simplified Users Manual were developed and were made available to the JRIMO staff during the Users Course conducted in the week prior to the Phase I demonstration.

The demonstrations themselves consisted of a review of the three levels of PSA operations (informal, semi-formal, formal), a survey of PSA reports (standard data base outputs), illustration of forward and backward trace capability, and individual sessions devoted to hands-on use of the data base to program queries. During the training courses and at the conclusion of the demonstrations, time was made available for discussion of perceived shortfalls and/or recommended modifications to the prototype data base. Since development of the prototype has been evolutionary and participatory, it was not anticipated that there would be any proposals to significantly change the structure of the data base at this time, and there were none. However, the following data base limitations that have been mentioned in earlier interim reports and discussions warrant repeating here:

- This is a prototype data base. The data base is by no means complete. Although the data base of approximately 400 systems probably includes most Joint Systems, it is deficient in Service Unique and Command/Site Unique Systems. Only seven of potentially nearly 30 responses to the WIS Baseline Review Survey have been analyzed. On the requirements side, only a small number of representative requirements have been included in the data base, their purpose being solely to demonstrate the capability of the data base.

- The data base includes a number of Service unique and Command/Site unique systems that perform a strictly administrative function (e.g. providing information concerning courts-martial proceedings, command

dental service, etc.) that would appear to be of minimal command and control relevance and of little interest to the JRIM. Also, some of the "systems" are simply applications that support WWMCCS system operations (e.g., retrieval applications). Systems that appear to be of little interest to the JRIM have been assigned a keyword "DEL", and those "systems" that appear to be simply supporting applications have been assigned a keyword "SUPP". It is recommended that the systems that have been assigned these keywords be purged from the data base.

- As the data base is presently configured, the direct relationship between requirements and systems that is indicated by "Evolves Into" in the JRIM Real-world model and by "Consists of/Contained In" in the PSL Data model will not be displayed. Although the capability exists to display this relationship, the relationship is not established until after it has been determined, by way of data base queries, that a requirement is satisfied by a particular system or systems.

- The effect upon System "A" if System "B" is deleted cannot be displayed because no hierarchical relationship of systems has been established; however, the models can accomodate such a relationship should the JRIM decide that the value of having this information available in the data base is worth the expenditure of research effort that would be required to accumulate the necessary data.

4. Summary

The JRIM prototype data base has been successfully demonstrated, first on contractor computer resources, and then, to verify that the same functionality also exists on the government system, on government computer resources. Using the automated tool PSL/PSA and employing RUM and CPE functions/subfunctions and data classes as media, the capability of the prototype data base to retrieve, manipulate, and trace the data needed to integrate requirements and to relate requirements to data processing systems has been shown. A Standards and Conventions Manual (techniques and procedures) for maintaining the data base has

been developed and a simplified Users Manual (CDRL Item 022) as well as Help Guides (CDRL Item 023) that will further assist users in acquiring a familiarity with the prototype data base, have been prepared for the JRIMO staff.

The JRIM prototype data base represents a good initial step toward development of an automated operational capability to evaluate the adequacy and promote the quality of information processing support to the joint community in the RUM and CPE functional areas.